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EXAMINER	
WONG, EDNA	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 11/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,522	LEE, HYUNJUNG	
	Examiner	Art Unit	
	Edna Wong	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-11 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-11 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *March 29, 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Objections

Claims **5-7 and 11** are objected to because of the following informalities:

Claim 5

line 8, the word "volitiles" should be amended to the word -- volatiles --.

Claim 6

line 4, the word "volitiles" should be amended to the word -- volatiles --.

Claim 7

line 5, the word "articles" should be amended to the word -- particles --.

Claim 11

line 4, the word "volitiles" should be amended to the word -- volatiles --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims **1-11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

line 1, "the surface" lacks antecedent basis.

line 7, "DBP" is indefinite.

line 7, the claim has two periods.

lines 11-12, "the conventional and highly conductive carbon black particles" lack antecedent basis.

lines 12-13, "the conventional and highly conductive carbon black particles" lack antecedent basis.

line 15, "the deposited carbon layer" lacks antecedent basis. Is this the same as the deposited substantially continuous layer recited in claim 1, lines 13-14?

line 16, "said non-conductive surfaces" (plural) lack antecedent basis.

Claim 2

lines 2-4, it appears that the limitation of "about 1 to about 5 weight percent of total carbon black and about 0.1 to about 2 weight percent of carbon black having an oil

absorption number of at least about 150 $cm^3/100g$ as a DBP absorption number" is further limiting the liquid carbon black dispersion recited in claim 1, lines 3-10. However, it is unclear if it is. If it is, then it is suggested that the word "comprises" (from claim 2, line 1) be amended to the words -- further comprises --.

line 2, it appears that the total carbon black is the same as the carbon black particles recited in claim 1, line 5. However, it is unclear if it is.

lines 3-4, it appears that the "carbon black having an oil absorption number of at least about 150 $cm^3/100g$ as a DBP absorption number" is the same as the carbon black particles having an oil absorption number of at least about 150 $cm^3/100g$ as a DBP absorption number recited in claim 1, lines 6-7. However, it is unclear if it is.

line 4, "DBP" is indefinite.

Claim 4

line 1, "the carbon dispersion" lacks antecedent basis. Is this the same as the carbon black dispersion recited in claim 1, lines 3-4?

Claim 5

line 1, "the surface" lacks antecedent basis.

line 9, the claim has two periods.

lines 13-14, "the conventional and highly conductive carbon black particles" lack antecedent basis.

lines 14-15, "the conventional and highly conductive carbon black particles" lack antecedent basis.

line 17, "the deposited carbon layer" lacks antecedent basis. Is this the same as the deposited substantially continuous layer recited in claim 5, lines 15-16?

line 18, "said non-conductive surfaces" (plural) lack antecedent basis.

Claim 6

lines 2-4, it appears that the limitation of "about 1 to about 5 weight percent of total carbon black and about 0.1 to about 2 weight percent carbon black having a surface area of at least about 150 m^2/g or carbon black having a volatiles content of less than 5% by weight" is further limiting the liquid carbon black dispersion recited in claim 5, lines 3-12. However, it is unclear if it is. If it is, then it is suggested that the word "comprises" (from claim 6, line 1) be amended to the words -- further comprises --.

line 2, it appears that the total carbon black is the same as the carbon black particles recited in claim 5, line 5. However, it is unclear if it is.

line 3, it appears that the "carbon black having a surface area of at least about 150 m^2/g" is the same as that recited in claim 5, lines 6-7. However, it is unclear if it is.

lines 3-4, it appears that the "carbon black having a volatiles content of less than 5% by weight" is the same as that recited in claim 5, lines 8-9. However, it is unclear if it is.

Claim 7

line 1, "the surface" lacks antecedent basis.

Claim 8

lines 1-2, it appears that the "carbon black particles having an oil absorption number of at least about 150 $cm^3/100g$" are the same as those recited in claim 7, lines 4-5. However, it is unclear if they are. If they are, then it is suggested that the word -- the -- be inserted after the word "comprises".

Claim 9

line 2, it appears that the total carbon black is the same as the carbon black

particles recited in claim 7, line 3. However, it is unclear if it is.

lines 2-3, it appears that the "carbon black having a surface area of at least 150 m^2/g" is the same as that recited in claim 7, line 6. However, it is unclear if it is.

Claim 10

line 2, it appears that the total carbon black is the same as the carbon black particles recited in claim 7, line 3. However, it is unclear if it is.

lines 2-3, it appears that the "carbon black having an oil absorption number of at least about 150 $cm^3/100g$" is the same as that recited in claim 7, lines 4-5. However, it is unclear if it is.

Claim 11

line 2, it appears that the total carbon black is the same as the carbon black particles recited in claim 7, line 3. However, it is unclear if it is.

lines 2-3, it appears that the "carbon black having a volatiles content of less than 5% by weight" is the same as that recited in claim 7, line 7. however, it is unclear if it is.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Process

I. Claims **1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Carano et al.** (US Patent No. 6,440,331 B1) in combination with **Bele et al.** (US Patent No. 6,235,182 B1) and **Minten et al.** (US Patent No. 4,619,741).

Carano teaches a process for electroplating a conductive metal layer onto the surface of a non-conductive material comprising the steps of:

(a) contacting said non-conductive surface (= nonconductive through hole and via walls of printed wiring boards) [col. 1, lines 20-23] with a liquid carbon black dispersion comprising:

(i) carbon black particles (col. 5, lines 4-25);

(ii) one or more dispersing agents (col. 7, lines 50-54); and

(iii) water (col. 8, lines 52-54);

(b) separating substantially all of the water from the conventional and highly conductive carbon black particles, such that the conventional and highly conductive carbon black particles are deposited on the non-conductive surface in a substantially continuous layer; and thereafter

(c) electroplating a conductive metal layer over the deposited carbon layer and said non-conductive surfaces (col. 10, lines 14-29).

The carbon black dispersion comprises about 1 to about 5 weight percent of total carbon black (= from about 0.1 to about 20% by weight) [col. 4, lines 4-12].

The process of Carano differs from the instant invention because Carano does not disclose the following:

a. Wherein the liquid carbon black dispersion comprises carbon black particles having an oil absorption number of at least about 150 cm^3/100 g as a DBP absorption number, as recited in claim 1.

b. Wherein the carbon black dispersion comprises about 0.1 to about 2 weight percent of carbon black having an oil absorption number of at least about 150 cm^3/100 g as a DBP absorption number, as recited in claim 2.

Carano teaches that one component of the conductive composition is electrically conductive carbon, for example, carbon black, graphite or combinations of the two (col. 3, line 61 to col. 4, line 3). The admixture of carbon black and graphite may be synergistic in the contemplated coating compositions because graphite is more conductive but hard to grind to sub-micron size, while carbon black is normally sub-micron sized but less conductive (col. 4, lines 43-52). Carano teaches that all types of carbon blacks may be used including the commonly available *furnace blacks* (col. 5, lines 4-5).

Like Carano, Bele teaches depositing a layer of carbon black on a non-conductive surface. Bele teaches an aqueous dispersion contained carbon black, PRINTEX XEZ (col. 6, line 58 to col. 7, line 8) and SPECIAL BLACK 550 (col. 9, lines 59-67). A carbon black layer with good conductivity on the substrate surfaces was obtained (col. 11, lines 21-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the liquid carbon black dispersion described by Carano with wherein the liquid carbon black dispersion comprises carbon black particles having an oil absorption number of at least about 150 cm^3/100 g as a DBP absorption number; and wherein the carbon black dispersion comprises about 0.1 to about 2 weight percent of carbon black having an oil absorption number of at least about 150 cm^3/100 g as a DBP absorption number because the teachings of Carano would have suggested to one having ordinary skill in the art that mixing electrically conductive carbon particles would have improved the electrically conductivity of the resulting carbon coating (col. 2, lines 35-39) and is capable of being exposed to molten solder without resulting in the formation of blowholes (col. 2, lines 53-55). Bele discloses commonly available furnace blacks, PRINTEX XEZ and SPECIAL BLACK 550, which would have been suitable to use as the carbon in the liquid carbon dispersion disclosed by Carano (col. 5, lines 4-5).

As to about 0.1 to about 2 weight percent of the carbon black having an oil absorption number of at least about 150 cm^3/100 g as a DBP absorption number, the

concentration of the carbon black having an oil absorption number of at least about 150 $cm^3/100$ g as a DBP absorption number is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would have determined the success of the desired reaction to occur, i.e., the conductivity of the carbon coating and the dispersibility of the carbon in the aqueous dispersing medium, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(II)(B).

c. Wherein the liquid carbon black dispersion comprises an alkali metal hydroxide, as recited in claim 1.

Like Carano, Minten teaches depositing a layer of carbon black on a non-conductive surface. Minten teaches that an alkaline metal hydroxide may be added to a liquid carbon black dispersion in a proportion sufficient to increase the pH of the resulting carbon black-containing dispersion to between about 10 and about 14 (col. 8, line 66 to col. 9, line 3). The porous nature of carbon black particles enhances absorption of alkaline silicate from the liquid dispersion. As a result, there is a relatively high concentration of alkaline silicate in the pores of the carbon black particles after drying. The presence of alkaline silicate in the pores appears to enhance the conductivity of the carbon black particles during the subsequent electroplating step (col. 9, lines 4-32).

Carano teaches the composition may be diluted with an aqueous dispersing medium, which may include one or more of *a buffer*, a dispersing agent, a surfactant, or

other ingredients (col. 8, lines 61-1-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the liquid carbon black dispersion described by Carano with wherein the liquid carbon black dispersion comprises an alkali metal hydroxide because an alkaline metal hydroxide would have buffered the carbon black-containing dispersion to the desired pH as taught by Minten (col. 8, line 66 to col. 9, line 3).

Furthermore, reacting the alkaline hydroxide with fumed silica particles would have formed the corresponding soluble alkaline silicate. The presence of alkaline silicate in the pores of the carbon black particles would have enhanced the conductivity of the carbon black particles during the subsequent electroplating step as taught by Minten (col. 9, lines 4-32).

d. Wherein said dispersing agent is selected from the group consisting of phosphate esters, alkaline sulfonates, organic sulfonates, ethoxylated alcohols and ethoxylated polymers based on maleic or stearic acid, as recited in claim 3.

Like Carano, Minten teaches depositing a layer of carbon black on a non-conductive surface. Minten teaches a surfactant capable of dispersing carbon black in a liquid dispersing medium. Suitable surfactants include anionic, nonionic and cationic surfactants (col. 7, lines 56-67). If the total dispersion is alkaline, it is preferred to employ an anionic or nonionic surfactant. Acceptable anionic surfactants include sodium

or potassium salts of naphthalene sulfonic acid and neutralized phosphate ester-type surfactants (col. 8, lines 5-17).

Carano teaches that the dispersing agent is an anionic dispersing agent (col. 50-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the dispersing agent described by Carano with wherein said dispersing agent is selected from the group consisting of phosphate esters, alkaline sulfonates, organic sulfonates, ethoxylated alcohols and ethoxylated polymers based on maleic or stearic acid because anionic surfactants such as sodium or potassium salts of naphthalene sulfonic acid and neutralized phosphate ester-type surfactants would have been suitable to disperse the carbon black in the liquid dispersing medium as taught by Minten (col. 8, lines 5-17).

e. Wherein the pH of the carbon dispersion is about 10-11, as recited in claim 4.

Like Carano, Minten teaches depositing a layer of carbon black on a non-conductive surface. Minten teaches that an alkaline metal hydroxide may be added to a liquid carbon black dispersion in a proportion sufficient to increase the pH of the resulting carbon black-containing dispersion to between about 10 and about 14 (col. 8, line 66 to col. 9, line 3).

It would have been obvious to one having ordinary skill in the art at the time the

invention was made to have modified the pH of the carbon dispersion described by Carano with wherein the pH of the carbon dispersion is about 10-11 because the pH is a result-effective variable and one skilled in the art has the skill to calculate the pH that would have determined the success of the desired reaction to occur, e.g., stabilizing the dispersion against coagulation of the particles, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(II)(B).

Furthermore, a resulting carbon black-containing dispersion having a pH between about 10 and about 14 is conventional in the art as taught by Minten (col. 8, line 66 to col. 9, line 3).

II. Claims **5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Carano et al.** (US Patent No. 6,440,331 B1) in combination with **Bele et al.** (US Patent No. 6,235,182 B1) and **Minten et al.** (US Patent No. 4,619,741).

Carano et al., Bele et al. and Minten et al. are as applied for reasons as discussed above and incorporated herein.

The process of Carano differs from the instant invention because Carano does not disclose the following:

a. Wherein the liquid carbon black dispersion comprises carbon black particles selected from the group consisting of carbon black particles having a surface area of at least about 150 m^2/g and carbon black particles having a volatiles content of less than 5% by weight, as recited in claim 5.

b. Wherein the carbon black dispersion comprises about 0.1 to 2 weight percent carbon black having a surface area of at least about 150 m^2/g or carbon black having a volatiles content of less than 5% by weight, as recited in claim 6.

Carano teaches that one component of the conductive composition is electrically conductive carbon, for example, carbon black, graphite or combinations of the two (col. 3, line 61 to col. 4, line 3). The admixture of carbon black and graphite may be synergistic in the contemplated coating compositions because graphite is more conductive but hard to grind to sub-micron size, while carbon black is normally sub-micron sized but less conductive (col. 4, lines 43-52). Carano teaches that all types of carbon blacks may be used including the commonly available *furnace blacks* (col. 5, lines 4-5).

Like Carano, Bele teaches depositing a layer of carbon black on a non-conductive surface. Bele teaches an aqueous dispersion contained carbon black, PRINTEX XEZ (col. 6, line 58 to col. 7, line 8) and SPECIAL BLACK 550 (col. 9, lines 59-67). A carbon black layer with good conductivity on the substrate surfaces was obtained (col. 11, lines 21-22).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the liquid carbon black dispersion described by Carano with wherein the liquid carbon black dispersion comprises carbon black particles selected from the group consisting of carbon black particles having a surface area of at least about 150 m^2/g and carbon black particles having a volatiles content of less than

5% by weight; and wherein the carbon black dispersion comprises about 0.1 to 2 weight percent carbon black having a surface area of at least about 150 m^2/g or carbon black having a volatiles content of less than 5% by weight because the teachings of Carano would have suggested to one having ordinary skill in the art that mixing electrically conductive carbon particles would have improved the electrically conductivity of the resulting carbon coating (col. 2, lines 35-39) and is capable of being exposed to molten solder without resulting in the formation of blowholes (col. 2, lines 53-55). Bele discloses commonly available furnace blacks, PRINTEX XEZ and SPECIAL BLACK 550, which would have been suitable to use as the carbon in the liquid carbon dispersion disclosed by Carano (col. 5, lines 4-5).

As to about 0.1 to 2 weight percent carbon black having a surface area of at least about 150 m^2/g or carbon black having a volatiles content of less than 5% by weight, the concentration of the carbon black is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would have determined the success of the desired reaction to occur, i.e., the conductivity of the carbon coating and the dispersibility of the carbon in the aqueous dispersing medium, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(II)(B).

III. Claims **8-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Carano et al.** (Us Patent No. 6,440,331 B1) in combination with **Bele et al.** (US Patent No. 6,235,182 B1) and **Minten et al.** (US Patent No. 4,619,741).

Carano et al., Bele et al. and Minten et al. are as applied for reasons as discussed above and incorporated herein.

Carano also teaches a composition useful in the electroplating a conductive metal layer onto a surface of a non-conductive material.

The composition comprises carbon black particles having a volatiles content of less than 5% by weight (= 1-10% volatiles) [col. 3, line 66 to col. 4, line 2].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edna Wong
Primary Examiner
Art Unit 1753

EW
November 18, 2005